

Rochelle Desser, February 24, 2020

J. Herbert Stone Nursery Water Resources Affected Environment and Monitoring Results Summary

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The purpose of this paper is to provide context for the analysis of effects of pesticide use at J. Herbert Stone Nursery (JHSN, the Nursery). The affected environment and setting at the Nursery and surrounding area are briefly described. Information about past, present and proposed pesticide use is outlined. Results of pesticide contaminant monitoring that has occurred in the vicinity is described.

Introduction

The J. Herbert Stone Nursery is located on a 306-acre parcel at 2606 Old Stage Road, Central Point Oregon, in Jackson County. It contains 220 acres of fields, 5 greenhouses and shade houses, a small constructed wetland, a solar array, and a 7-acre reservoir that can be used to collect and recycle irrigation water.

Primary crops grown include conifers, grass for seed, and native plants for ecological restoration. The Southwest Oregon Forest Health Service Center is located at the nursery. The Forest Health Service Center and JHSN operations headquarters are located in the northwest part of the property. A pollinator garden has been planted near the northwest gate.

JHSN is administered by the Rogue River Siskiyou National Forest, although it lies in an agricultural area outside the National Forest boundary. It is an administrative site that was established to provide plant materials for the Forest Service, Bureau of Land Management, and other public land clients. JHSN needs to grow plant products in an economically efficient manner.

The Forest Service considered purchase of the property and using it as a nursery in 1976. At that time, 257 acres were purchased, with 49 adjacent acres purchased later. In 1976, the land was used for agriculture, including a 56-acre pear orchard, grain fields and pasture land.

The nursery is surrounded by privately owned agricultural parcels and rural residences. No Forest-specific standards and guidelines apply to the site and it is not directly addressed in the Rogue River National Forest Plan (USDA Forest Service 1990), however, Forest Service laws, policies and regulations apply.

Pesticide Use at the Nursery

Pesticides have been routinely used since JHSN was established. The Nursery has found that pesticides are needed to maintain an environment capable of producing conifer, shrub, forb, and grass seed crops at a cost that is affordable to clients. Over the years, the Nursery has endeavored to minimize impacts from pesticide application by using the least amount and safest of the effective pesticide products available, and has taken the concerns of pesticide applicators and other nursery workers into account when preparing pesticide-use plans.

An Environmental Impact Statement and Record of Decision were prepared in 1989 (USDA Forest Service 1989) considering pesticide use at JHSN and other Forest Service nurseries in Oregon and Washington. That decision required nursery managers to use integrated pest management approaches that emphasize pest prevention, minimize chemical applications and consider non-chemical practices where they are effective.

The 1989 decision also required JHSN to properly train pesticide applicators and other employees about safe work practices, use personal protective equipment, and communicate hazards to workers and neighbors. Several mitigation measures were presented to reduce potential for the pesticides to harm people or the environment. Best practices for pesticide use have evolved over the years, and JHSN uses pesticides in a manner consistent with product labels that apply current best practices. Another example is care taken to promote pollinators and protect them from chemical use. Crops grown at the nursery have also evolved over the years; in 1989 the nursery focused on conifer production, but now meets the need for grass seed, and native shrubs and forbs for ecological restoration that has increased across the land management agencies.

The following table reflects the 1989 decision for pesticide use at the Nursery

Table 1. Pesticides in use for the JHSN from the 1989 record of decision

Herbicides	Bifenox, Dicamba, Diphenamid, Glyphosate, Oxyfluorfen
Insecticides	Chlorpyrifos, Fenvalerate (currently substituted with Esfenvalerate, an insecticide with a similar profile)
Fungicide	Benomyl, Chlorothalonil, DCNA, Metalaxyl
Fumigant	Methyl Bromide, Dazomet

Between 1989 and 1996, three National Environmental Policy Act (NEPA) decisions were documented using the supplemental process, and four fungicides (Iprodione, Mancozeb, Propiconazole, Thiophanate-methyl and Thiram) and one herbicide (Simazine) were added.

In 2005, the Pacific Northwest Region of the Forest Service (R6, including Oregon) released a Record of Decision (ROD) providing regional standards and guidelines for use of herbicides for invasive plant management. Clopyralid and imazapic have been used for invasive plant control in non-production areas of the Nursery, based on the regional analysis (non-documented Categorical Exclusion for administrative site maintenance). Some of the previously authorized chemicals are no longer in use.

The following table shows pesticides no longer used at the Nursery.

Table 2. Pesticides no longer in use at JHSN

Herbicides	Bifenox, Diphenamid,
Insecticides	All currently in use
Fungicide	Benomyl, DCNA, Metalaxyl (Metalaxyl is no longer labeled for use. A fungicide with a similar, more effective and less toxic profile, Mefenoxam, has been substituted under the same product name (Subdue Maxx)).
Fumigant	Methyl Bromide

The following table notes additional products considered for use at the JHSN in the current proposal.

Table 3. Additional pesticides considered for use at JHSN under the current proposal

Herbicides	2,4D (acid), imazapyr, oryzalin, predimethalin, proflaminate
Insecticides	Pyriproxyfen
Fungicide	No new products
Algaecide	Sodium carbonate peroxyhydrate

A detailed proposed action is described in another report, including descriptions of application methods, application rates, season of use, and other information.

Affected Environment

The action area is the 306-acre J. Herbert Stone Nursery including production and non-production areas (figure 1 and figure 2).

This report describes the surface and subsurface drainage system associated with the Nursery, and summarizes watershed analysis and monitoring findings pertinent to understanding the potential for pesticide use to affect water quality or beneficial uses of water. The focus on water is due to the extraordinary circumstances related to water, including impacts on floodplains, wetlands, and aquatic species or habitats of concern. Information about climate, soils and geology, botany, noxious weeds, and cultural resources are available in other reports.

JHSN is comprised of agricultural fields; greenhouses and shade houses; a reservoir; and non-production lands including buildings, roads, fence lines, a solar array, and field J (which is not used for growing plant products). A wetland was constructed adjacent to the reservoir that is also a non-production area.

Soils are primarily sandy loam.

Three streams are within or adjacent to JHSN. These include Upper Horn Creek in the northwest portion of the nursery; Jackson Creek, which flows through the eastern portion of the nursery; and Lower Horn Creek, which is located in the southeast portion of the nursery.

Upper and lower Horn Creek are intermittent streams; both are partially diverted into culverts before emerging again on the surface. Jackson Creek is a perennial stream with an estimated base flow of approximately 3 cubic feet per second during the year (Park 2014). However, that

base flow is disrupted by irrigation; water is removed for irrigation and replaced by water released by the Rogue River Irrigation District. A prominent irrigation waterway, Hopkins Canal, is located in the northeast portion of the nursery.

JHSN has rights to water from Jackson Creek for nursery irrigation. Jackson Creek goes dry during the irrigation season; water is delivered from an upstream source through a canal system back to the creek and then diverted for irrigation use at the nursery at a dam located near where Lower Horn meets Jackson Creek. The nursery uses a fraction of its water right (Justin 2019); the reservoir collects subsurface water (more discussion below) and sometimes returns it for irrigation, therefore conserving water.

The streams have been simplified over time due to development and irrigation. Roads are located nearby on both sides of the three waterways. Invasive plants (mainly blackberry) dominate the riparian vegetation and banks. Some native trees (cottonwood, pine) grow at the top of the stream bank. The streams are deeply incised (10-20 feet) and the channels appear straightened.

Surface and Subsurface Drainage System

The production fields (A through I and K, figure 2) are underlain with 6-inch perforated pipes, buried and covered approximately 3-4 feet below the surface. On the west side of Jackson Creek, water that leaches through the fields is intercepted by these pipes and directed toward a sump north and east of field D. During the dry season, water in the sump is pumped into the reservoir and eventually used for irrigation. During wetter months, the water in the sump flows directly into Jackson Creek (Justin 2019). On the east side of Jackson Creek, the tiles are directed to a pipe that enters Jackson Creek.

The roads that cross the nursery and surround the production fields (figure 2) also contain storm drains that eventually enter the creeks. Three storm drain outlets into Jackson Creek have been located on a map but are difficult to find because the berry brambles are so thick.

Surface runoff from the greenhouses and shade houses is directed into the constructed wetlands. The constructed wetlands are not directly connected to Jackson Creek and pesticide residue from treatment within the greenhouses/shadehouses is unlikely to enter Jackson Creek.

Run off is likely the primary cause of any pesticide entering Jackson Creek from nursery application in production fields. Measures to minimize run off via irrigation management and minimizing spraying during rainy periods would help reduce potential for pesticide delivery to the creek.

Jackson Creek Watershed

Jackson Creek is a tributary to Bear Creek, which flows into the Rogue River. A watershed assessment was conducted for Willow, Jackson, and Griffin Subwatersheds in 2001 by the Bear Creek Watershed Council, Rogue Valley Council of Governments.

Link to Watershed Assessment: <https://www.worldcat.org/title/bear-creek-watershed-assessment-phase-ii-bear-creek-tributary-assessment/oclc/50223268>

The Jackson Creek watershed is located on the lower northwest side of Bear Creek, and enters Bear Creek about two miles northeast of Central Point. The catchment is 16,139 acres in size, and is characterized by agricultural and forest lands, residential and commercial lands, and the municipalities of Jacksonville and Central Point. Maximum relief in the watershed is 2,634 feet, and the average slope steepness of the upland area is about 21 percent. The mean elevation of the

Jackson Creek watershed is 2,004 feet. The area of the catchment above 3,000 feet elevation encompasses about 11 percent of the drainage. Mean annual precipitation for the watershed is slightly less than 635 mm (25 inches).

The watershed council found that water quality is a particular problem in Willow, Jackson, and Griffin Creeks, and is impaired in the summer for temperature, fecal coliform levels, and total phosphorous. They found that irrigation transport and return flows are a source of water to the riparian areas, as well as a source of pollution, affecting water quality and fish distribution. The watershed council notes that without irrigation flows, there would be hardly any flow at times in some stream reaches.

Anadromous fish were found to be present in Jackson Creek subwatershed (coho are present up 3 miles downstream of the nursery and steelhead are present adjacent to the nursery), but production is limited by low summer flows and high summer temperatures, poor riparian habitat, and multiple barriers. Aquatic diversity was found to be low. Pesticides were not mentioned in the assessment as a source of pollution or concern in the Jackson Creek watershed.

Bear Creek Watershed

In 2007, the Oregon Department of Environmental Quality (DEQ) prepared a TMDL (Total Maximum Daily Load) for Bear Creek (HUC # 1710030801). The TMDL noted that 290 miles of natural creeks are present in the Bear Creek watershed. In addition, more than 250 miles of main irrigation canals are estimated to exist. In the vicinity of the nursery, natural stream flows within the Bear Creek watershed are greatly diminished by the end of June and replaced by irrigation conveyance flows. Small acreage landowners (those with 5 acres or less) make up 80 percent of the 6,000 estimated irrigation district accounts in the Bear Creek watershed. Water stored in the higher watersheds of Emigrant Lake, Fourmile Lake, Howard Prairie Lake, Fish Lake, Hyatt Lake, and Agate Reservoirs are conveyed by canal, ditch and natural creek to the watersheds below.

The TMDL did not include pesticide as a point source pollutant requiring a National Pollutant Discharge Elimination System (NPDES) permit. Laws changed and now a permit is required and submitted by JHSN for pesticide use. Pesticide use is not discussed in the TMDL.

TMDL link: <https://www.oregon.gov/deq/FilterDocs/rogueMRtmdlchp1sec12.pdf>

Monitoring Results

Nursery Monitoring

Some water sampling occurred between 1990 and 1995 to determine if pesticides were leaching or running off the nursery site. The monitoring was intended to meet the requirements laid out in the R6 1989 Nursery Pesticide decision. A study plan was prepared by Research Chemist Kenneth P Bentson considering the drainage at the nursery and the potential for pesticides to run off or leach into Jackson Creek (see white water quality notebook on file at the nursery library). Samples of surface and subsurface drainage were collected and analyzed to see if chlorothalonil or metalaxyl were present in run-off observed within 30 days of application. At no time during these 6 years of sampling were detections of these chemicals found above detection limits (5 parts per billion or less). These chemicals were selected because they were thought to pose the greatest likelihood of being found, and the lack of detection of these chemicals indicated that these and the other pesticides used at the nursery were not contaminating the stream.

In the 1989 FEIS, chlorothalonil use was estimated at 280 pounds per year, and metalaxyl use was estimated at 27 pounds per year. In contrast, it is now estimated that currently approximately 42 pounds of chlorothalonil and 1.25 pounds of metalaxyl (now mefenoxam) per year are in use at the nursery (Justin 2019). This indicates even less likelihood of meaningful detections in Jackson Creek.

Nitrates were also analyzed in water samples and found each year. Samples from 1995 ranged from 2.5 – 64.0 mg/L and was attributed to the use of fertilizer.

A 1995 study of turbidity found that the drainage system is working well to keep farm waste out of Jackson Creek.

Middle Rogue Pesticide Stewardship Partnership

The Middle Rogue Pesticide Stewardship Partnership (PSP), in coordination with Oregon Department of Agriculture, took water samples on Jackson Creek and other tributaries from 2015 to 2019. One of the monitoring sites is just downstream of the nursery at Beall Road, and another is 2.5 miles downstream at Bramson Road.

Additional information was obtained by the Forest Service regarding Middle Rogue Partnership sampling for oxyfluorfen in 2019. This herbicide has been detected every year 2016 to 2019 below the nursery at one or both of the two aforementioned locations in Jackson Creek. Of 50 samples taken at Bramson Creek over the four-year period, 10 had detectable concentrations of oxyfluorfen. One sample exceeded and another sample approached the EPA benchmark for aquatic nonvascular plants are were orders of magnitude below fish and invertebrate benchmarks. All sample concentrations were below amounts predicted by the GLEAMS model for proposed use. Monitoring of these sites is expected to continue and the proposed project is expected to reduce oxyfluorfen use and subsequent potential for this herbicide to enter Jackson Creek. Additional sediment controls such as wattles surrounding storm drains will minimize oxyfluorfen running off into Jackson Creek from spraying on production fields.

A 2017 summary paper concluded: "Generally, pesticide concentrations within the Middle Rogue watershed have been of little concern with the exception of the insecticide imidacloprid. A 5-year trend analysis of pesticide and pesticide metabolite concentrations indicate a downward trend for the herbicide diuron. Upward trends were indicated for glyphosate and its metabolite AMPA, oxfluorfen and sulfometuronmethyl. It is noted that for the vast number of pesticides sampled, there were no detections or too few to conduct a trend analysis, but positive indications."

A strategic plan has been developed (2019) with objectives for reducing oxyfluorfen detections

Middle Rogue PSP website link: <https://www.jswcd.org/the-middle-rogue-pesticide-stewardship-partnership>

<https://www.jswcd.org/middle-rogue-pesticide-stewardship-partnership-strategic-plan>

Report Link:

<https://www.oregon.gov/ODA/shared/Documents/Publications/PesticidesPARC/MiddleRogueSummary.pdf>

<https://www.jswcd.org/files/dbf65c532/MRPSP+Strategic+Plan+2019.pdf><https://www.jswcd.org/files/dbf65c532/MRPSP+Strategic+Plan+2019.pdf>

DEQ Water Quality Monitoring

The DEQ conducts water quality monitoring throughout the State of Oregon. The closest monitoring station is Bear Creek at Kirtland Avenue in Central Point, below the confluence of Jackson Creek and Bear Creek. This location is approximately 5 miles from the nursery.

The most recent monitoring results available are from 2011-2013. Monitoring was conducted in 2018 but results have not yet been published.

The DEQ sampled during spring, summer and fall and looked for many of the chemicals in use at the nursery. These included:

Table 4. DEQ chemical sampling for water quality monitoring 2011-2013

Herbicides	Dicamba, Imazapyr, Pendimethalin
Insecticides	Chlorpyrifos, Esfenvalerate, Pyriproxyfen
++Fungicide	Chlorothalonil, Propiconazole

There were no detections exceeding precise detection limits measured in ng/L (parts per trillion). This indicates that current pesticide use in the watershed surrounding the nursery does not contribute pesticide loads that might harm beneficial uses of water in Bear Creek.

Link to Data <https://www.oregon.gov/deq/wq/Pages/WQ-Monitoring-Statewide.aspx>

Statewide Water Quality Reports

The DEQ has published results of monitoring statewide for current-use pesticides (current use in contrast to legacy pesticides that are no longer in use but are still detected in water samples). Current use pesticide detections were common in streams throughout Oregon, occurring in all basins sampled, including the Rogue River Basin. Statewide, current use pesticides were detected at 53 percent of sites. Detections of more than one pesticide occurred in 19 percent of samples with 3 percent of samples having 6 to 10 pesticides. Fenvalerate/esfenvalerate was found in some places at concentrations higher than a level of concern for aquatic life.

However, no detections of current use pesticides were found in Bear Creek at Kirtland Road, the downstream sample site closest to the nursery (see local monitoring results above).

Oregon Department of Agriculture (ODA) also conducts monitoring with the pesticide stewardship partnerships such as the middle Rogue (described above). Statewide results for monitoring conducted between 2015 and 2017 indicate a significant number of non-detections for many of the most common pesticides, and for the pesticides that have been of greatest concern, the 5-year trend indicates positive improvement in water quality.

2015 DEQ report <https://www.oregon.gov/deq/FilterDocs/WQToxicsAssessmentReport.pdf>

2018 ODA Pesticide Stewardship Report and Fact Sheet

<https://www.oregon.gov/ODA/shared/Documents/Publications/PesticidesPARC/PSPBienniumReport2017.pdf>

<https://www.oregon.gov/ODA/shared/Documents/Publications/PesticidesPARC/PSPBiennialReportFactSheet.pdf>

<https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp>

2019 Middle Rogue Pesticide Stewardship Partnership Strategic Plan

Maps Showing Context and Setting of JHSN

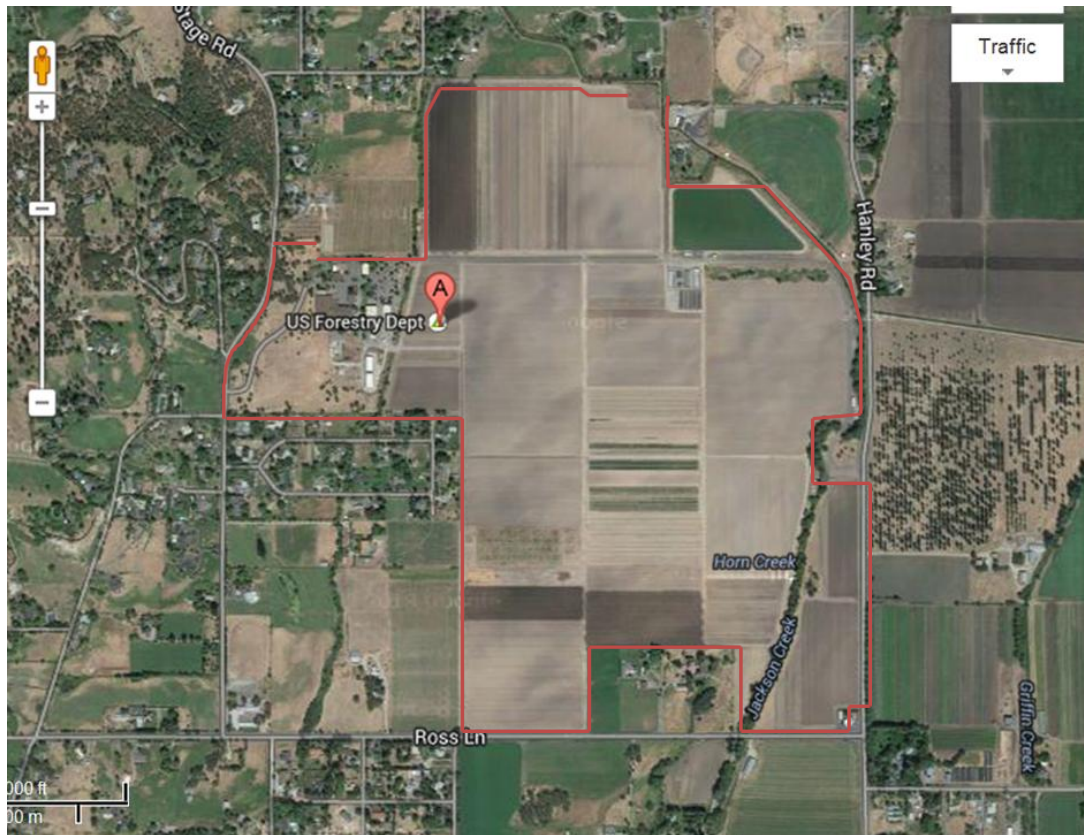


Figure 1a. JHSN aerial photo



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